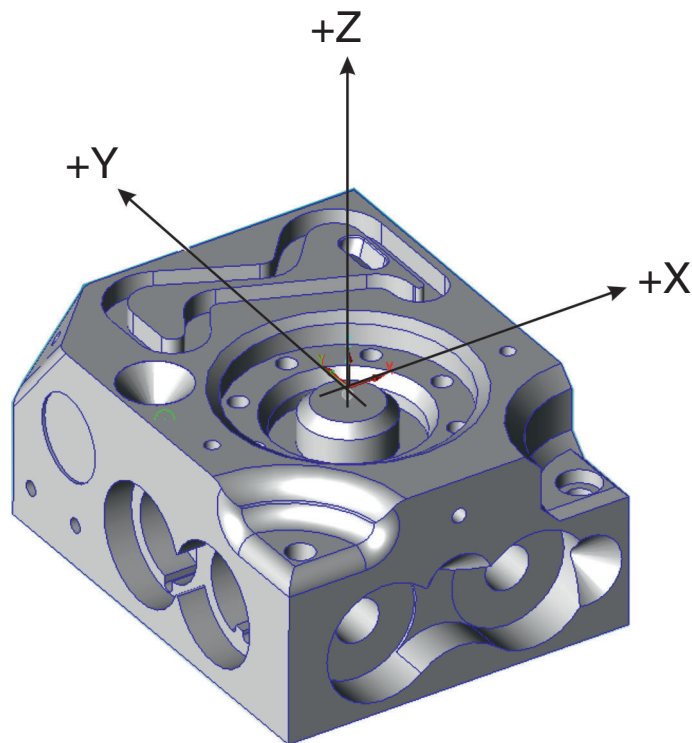


# Further CNC feature measurement (CAD)



© 2013 - 2014 Renishaw plc. All rights reserved.

Renishaw® is a registered trademark of Renishaw plc.

This document may not be copied or reproduced in whole or in part, or transferred to any other media or language, by any means, without the prior written permission of Renishaw.

The publication of material within this document does not imply freedom from the patent rights of Renishaw plc.

### **Disclaimer**

Considerable effort has been made to ensure that the contents of this document are free from inaccuracies and omissions. However, Renishaw makes no warranties with respect to the contents of this document and specifically disclaims any implied warranties. Renishaw reserves the right to make changes to this document and to the product described herein without obligation to notify any person of such changes.

### **Trademarks**

All brand names and product names used in this document are trade names, service marks, trademarks, or registered trademarks of their respective owners.

## **Further CNC feature measurement (CAD)**

## Care of equipment

Renishaw probes and associated systems are precision tools used for obtaining precise measurements and must therefore be treated with care.

## Changes to Renishaw products

Renishaw reserves the right to improve, change or modify its hardware or software without incurring any obligations to make changes to Renishaw equipment previously sold.

## Warranty

Renishaw plc warrants its equipment for a limited period (as set out in our Standard Terms and Conditions of Sale) provided that it is installed exactly as defined in associated Renishaw documentation.

Prior consent must be obtained from Renishaw if non-Renishaw equipment (e.g. interfaces and/or cabling) is to be used or substituted. Failure to comply with this will invalidate the Renishaw warranty.

Claims under warranty must be made from authorised service centres only, which may be advised by the supplier or distributor.

## Trademarks

Windows 98, Windows XP, Windows 2000 and Windows NT are registered tradenames of the Microsoft Corporation.

IBM is the tradename of the International Business Machines Inc

All trademarks and tradenames are acknowledged.

## Contents

1	Further CNC feature measurement (CAD).....	6
1.1	Tutorial pre-requisites.....	6
1.2	Tutorial objectives.....	6
2	Introduction.....	7
3	Measuring multiple holes.....	8
4	Measuring arcs.....	13

# **1 Further CNC feature measurement (CAD)**

## **1.1 Tutorial pre-requisites**

- The student should have completed, and have a sound knowledge of all 'Alignment' tutorials

## **1.2 Tutorial objectives**

- Further exposure to feature measurement using data obtained from a CAD model
- Introduction to the use of 'multi' features
- Introduction to measurement in 'AUTO' mode and the settings that apply

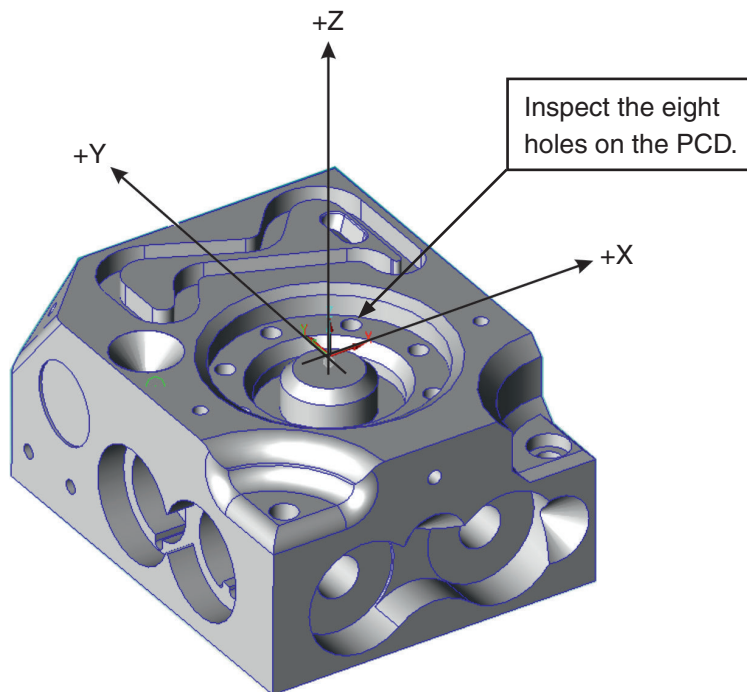
## 2 Introduction

This tutorial will introduce the student to further CNC feature measurement options including multi-feature measurement. Additionally, the student will be introduced to a measurement settings and measurement options specific to running a program using automatically calculated movement and measurement paths.

### 3 Measuring multiple holes

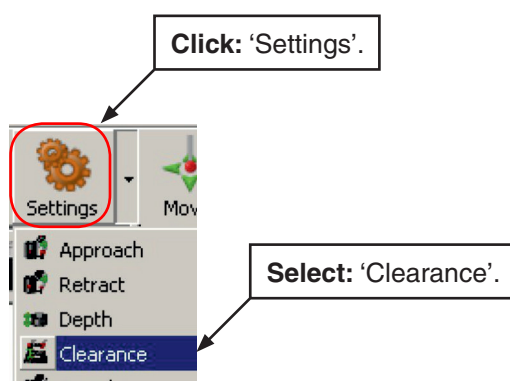
Prior to using this tutorial the part must be precisely aligned as described in previous tutorials.

In this tutorial, the eight holes on the PCD will be measured automatically (as shown in the diagram below):

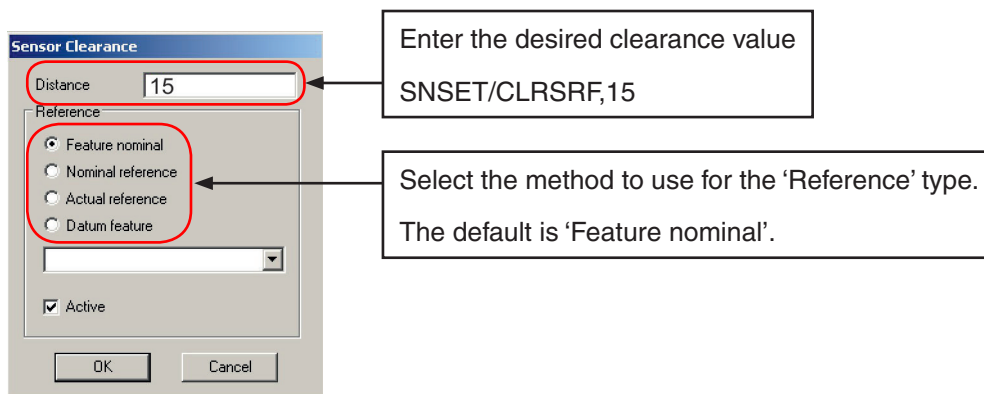


Firstly a clearance plane should be set. This sets the distance that the CMM moves away from a feature before inspecting the next feature.

To set the value for the clearance plane:

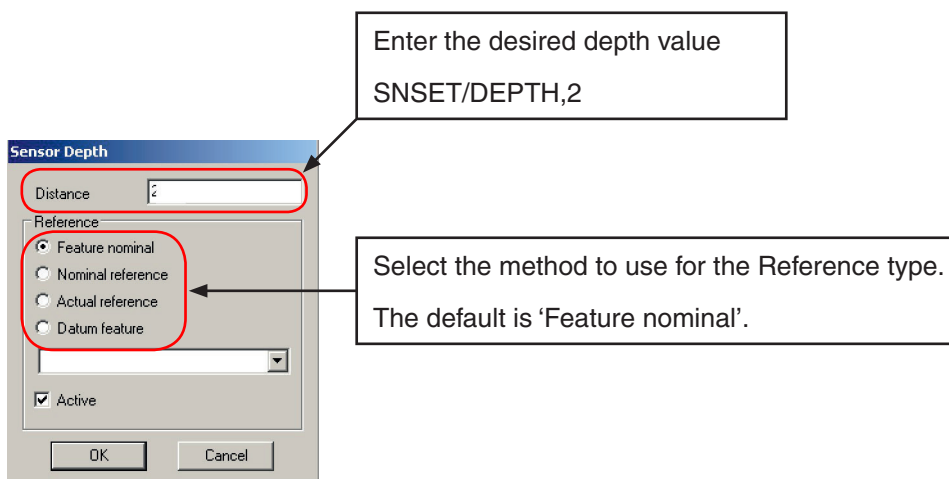
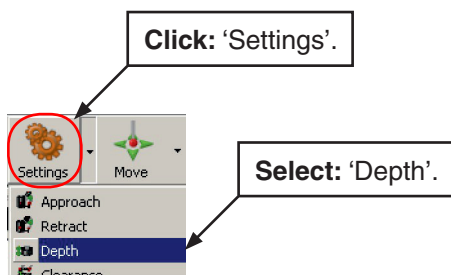




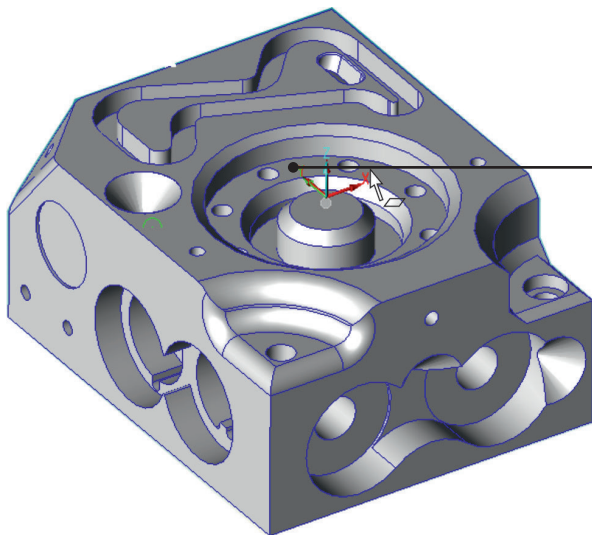
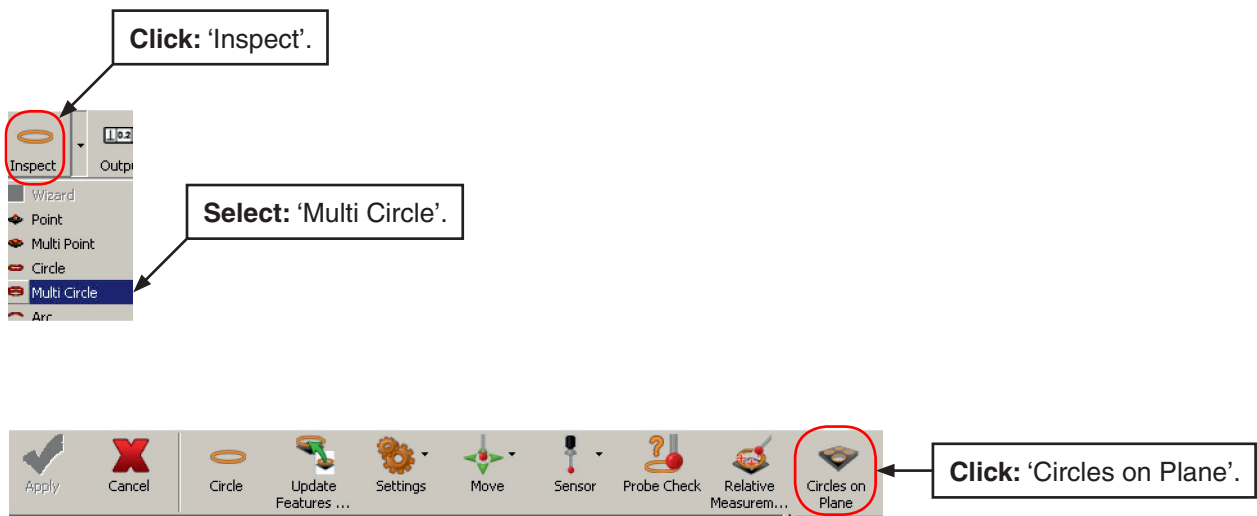


Next, the sensor depth should be set. This is the distance into a feature (hole, slot etc.) that the CMM will take the probe to inspect the feature.

To set the value for the depth away from the nominal:

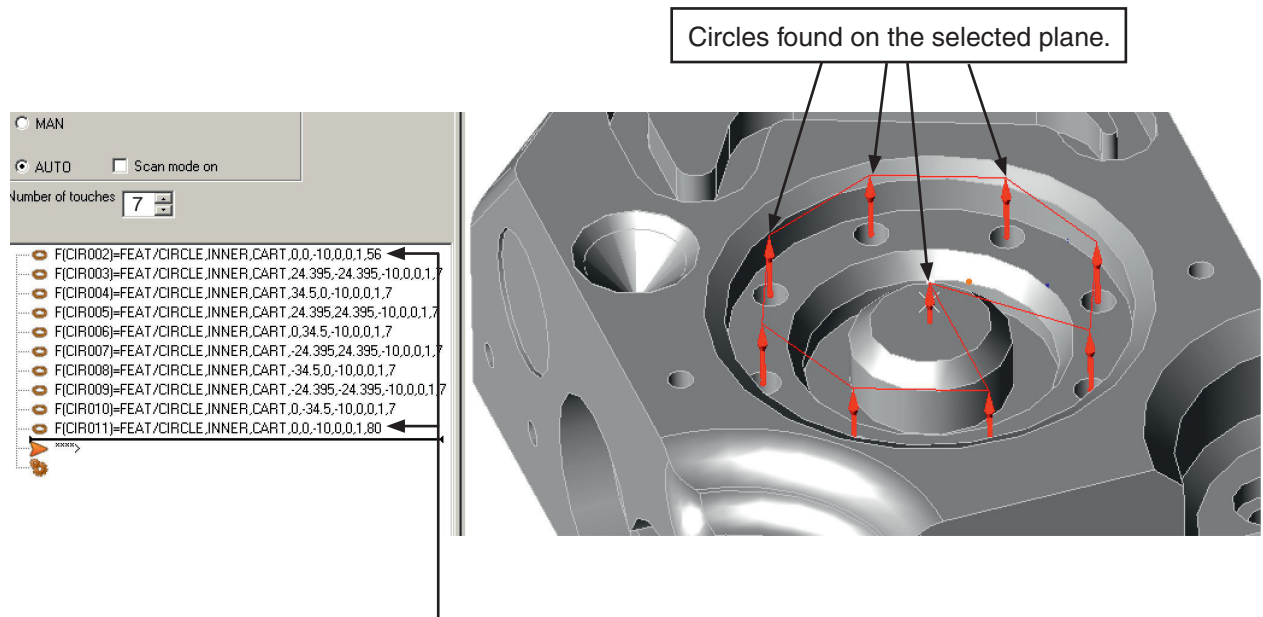


The features can now be inspected:

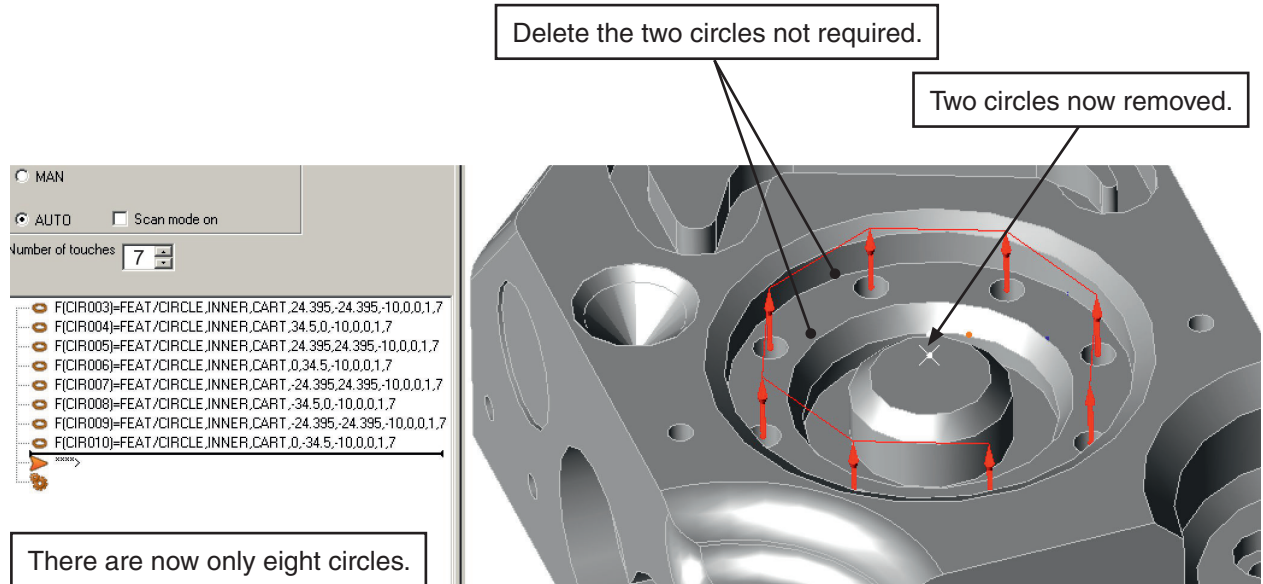


On the CAD model click on the plane that contains the holes to be measured.

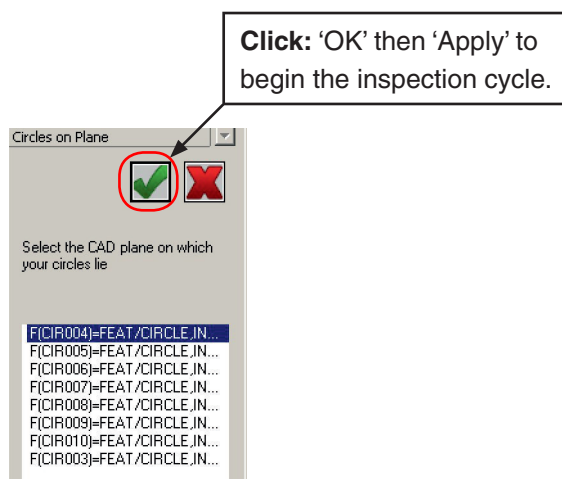
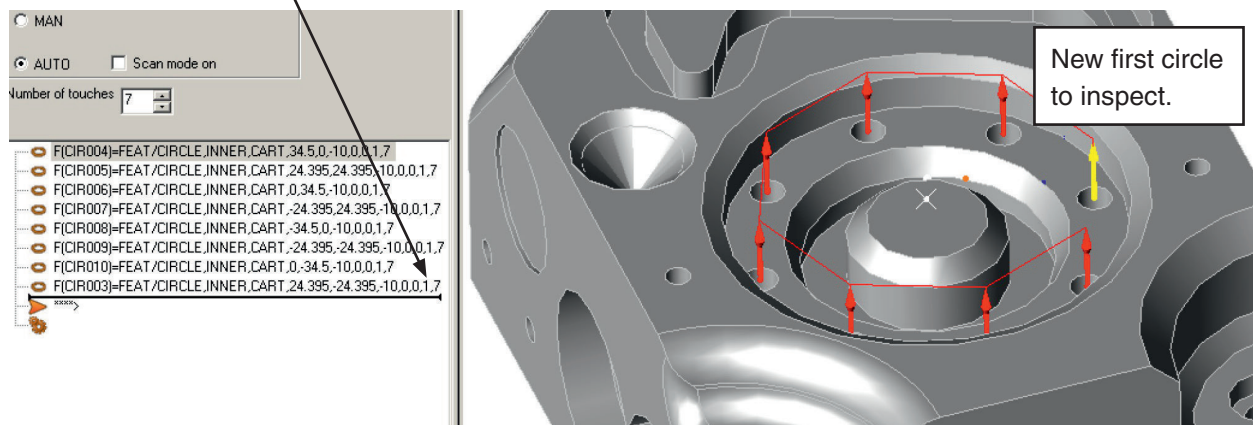
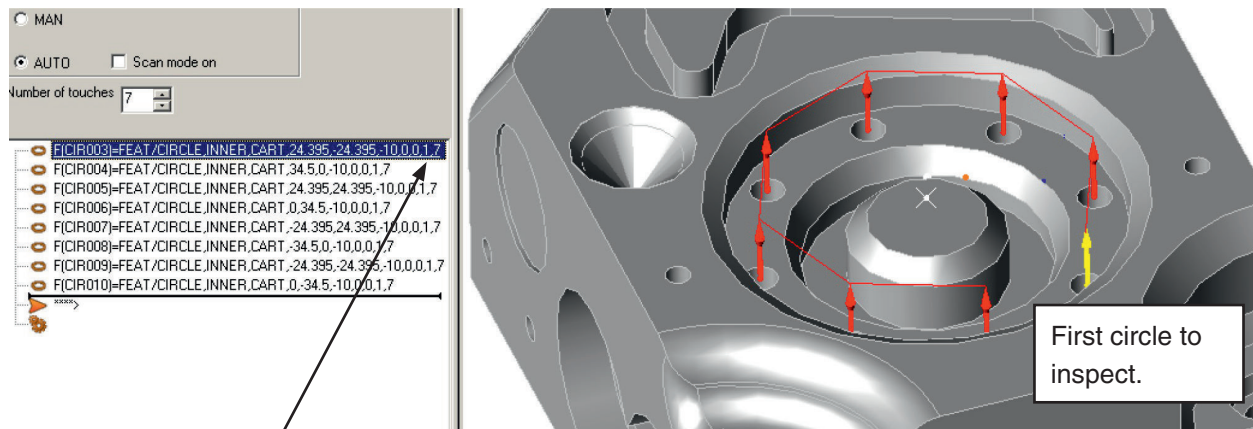
MODUS now places an arrow in the centre of each circle found on the selected plane and draws a path the CMM will take:



MODUS has selected ten circles so in this case delete the extra two (as shown below).

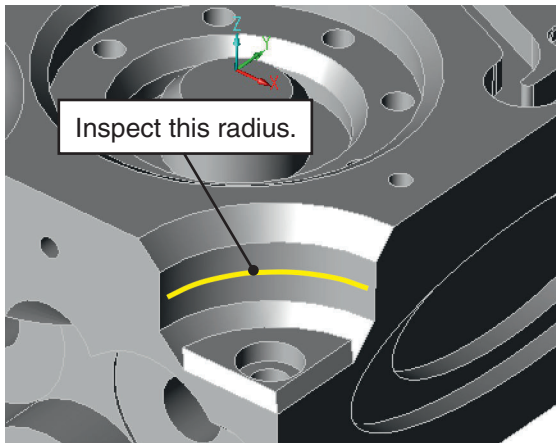


Now change the order / sequence, if desired, of each hole inspection by using drag and drop:



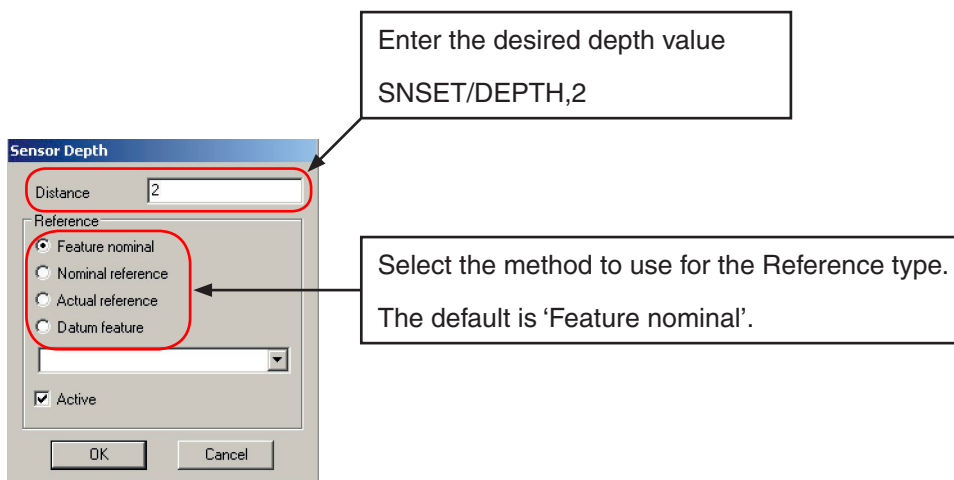
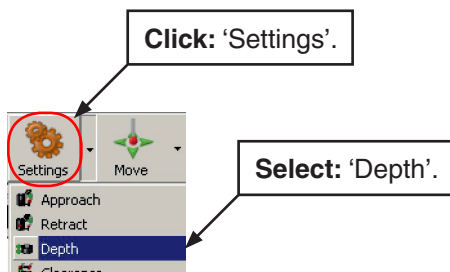
## 4 Measuring arcs

The diagram below shows which radius will be inspected:

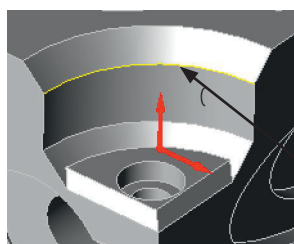
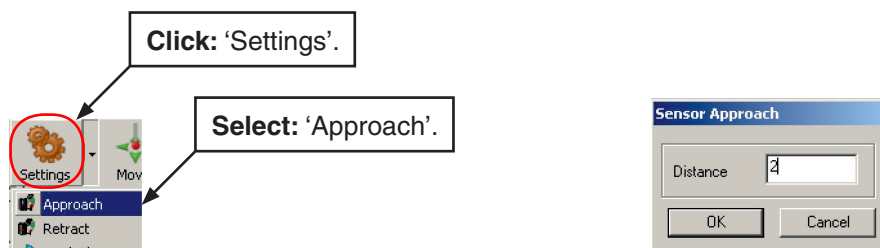


Move the probe to a clear position to inspect the radius then create a GOTO. This can be done either in MODUS by selecting 'Move' and clicking 'Absolute' or by clicking 'Take Point' on the MCU.

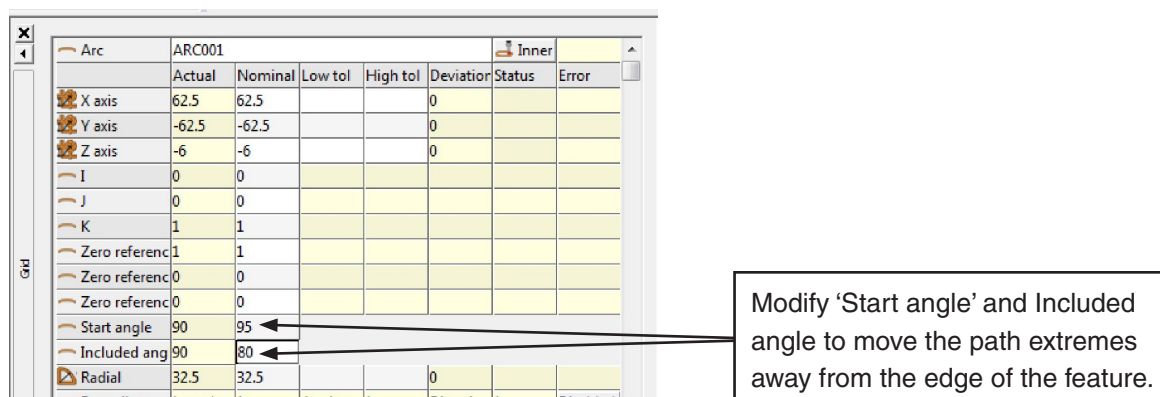
Set a value for the depth away from the nominal by clicking 'Settings' then selecting 'Depth'.



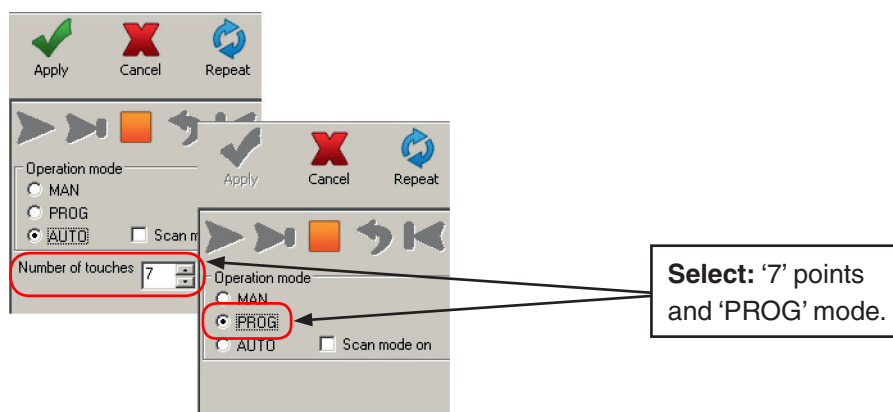
Click 'Settings' then select 'Approach' to set the approach distance.

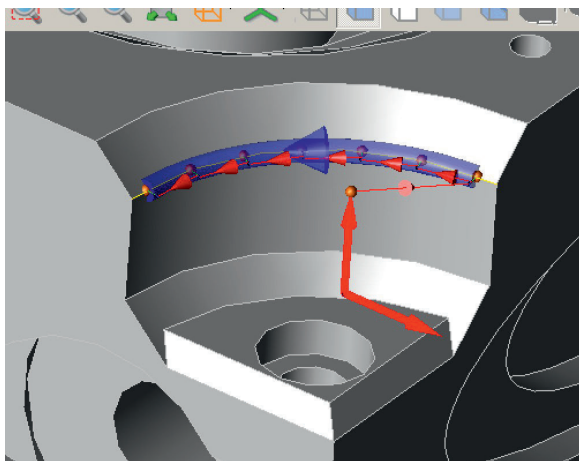
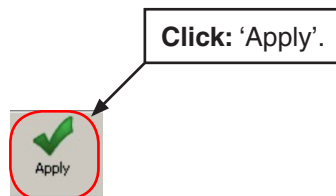
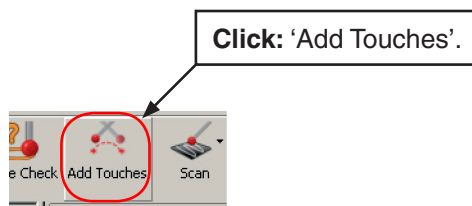


Click on the radius to inspect.




















**GUIDANCE NOTE:** The 'Number of touches' input is not available when 'PROG' mode is selected. To specify the number of touches required in 'PROG' mode, values must be modified in 'AUTO' mode before changing to 'PROG' mode.





The CMM will now measure seven points around the arc at a position LOWER than the CAD nominal as specified by the DEPTH function.

		Arc	ARC001						Inn	
			Actual	Nominal	Low tol	High to	Deviasi	Status	Error	
		X axis	62.499	62.5			-0.001			
		Y axis	-62.49	-62.5			0.001			
		Z axis	-6	-6			-0			
		I	0	0						
		J	0	0						
		K	1	1						
		Zero refer	1	1						
		Zero refer	0	0						
		Zero refer	0	0						
		Start angl	95	95						
		Included angl	80	80						
		Radial	32.499	32.5			-0.001			

**Renishaw plc**  
New Mills, Wotton-under-Edge,  
Gloucestershire, GL12 8JR  
United Kingdom

**T** +44 (0)1453 524524  
**F** +44 (0)1453 524901  
**E** [uk@renishaw.com](mailto:uk@renishaw.com)  
[www.renishaw.com](http://www.renishaw.com)

**RENISHAW**   
**apply innovation™**

**For worldwide contact details,  
please visit our main web site at  
[www.renishaw.com/contact](http://www.renishaw.com/contact)**



H - 1000 - 5317 - 01